

TFT-DISPLAY DATASHEET

ONation
Model: OT043AWDDDN-04

BRIEF SPEC.:

Main Feature	LandscapeType For outdoor application Wide Format
Active Screen Area	95.04 x 53.85 (mm)
Diagonal Format	4:3 " 16:9
Resolution	480 X 272
Colors	(8 Bit)
Backlight	LED
Brightness	500 cd/m ²
LED Life Time	20K (h)
Interface	TTL
Viewing Angle	65/65 L/R 50/60
Touchscreen	No
Power Supply	3.3 V (Typ.)
Module Outline	105.6 x 67.3 x 3.9 (mm)
Operation Temperature	-20... +70 °C
Storage Temperature	-30... +80 °C
Surface Treatment	



ONation Corporation

TFT COLOR LCD MODULE

MODEL: OT043AWDDDN-04
(Complied with RoHS)

WQVGA
TTL interface

Version: P0.5

Customer : _____
Approved By : _____
Date: _____

ONATION		
APPROVAL	CHECKER	PREPARE
<i>Jan</i>	<i>Jan</i>	<i>Josh</i>

[All information is subject to change without notice.](#)
[Please confirm the sales representative before starting to design your system](#)

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1. RECORD OF REVISION

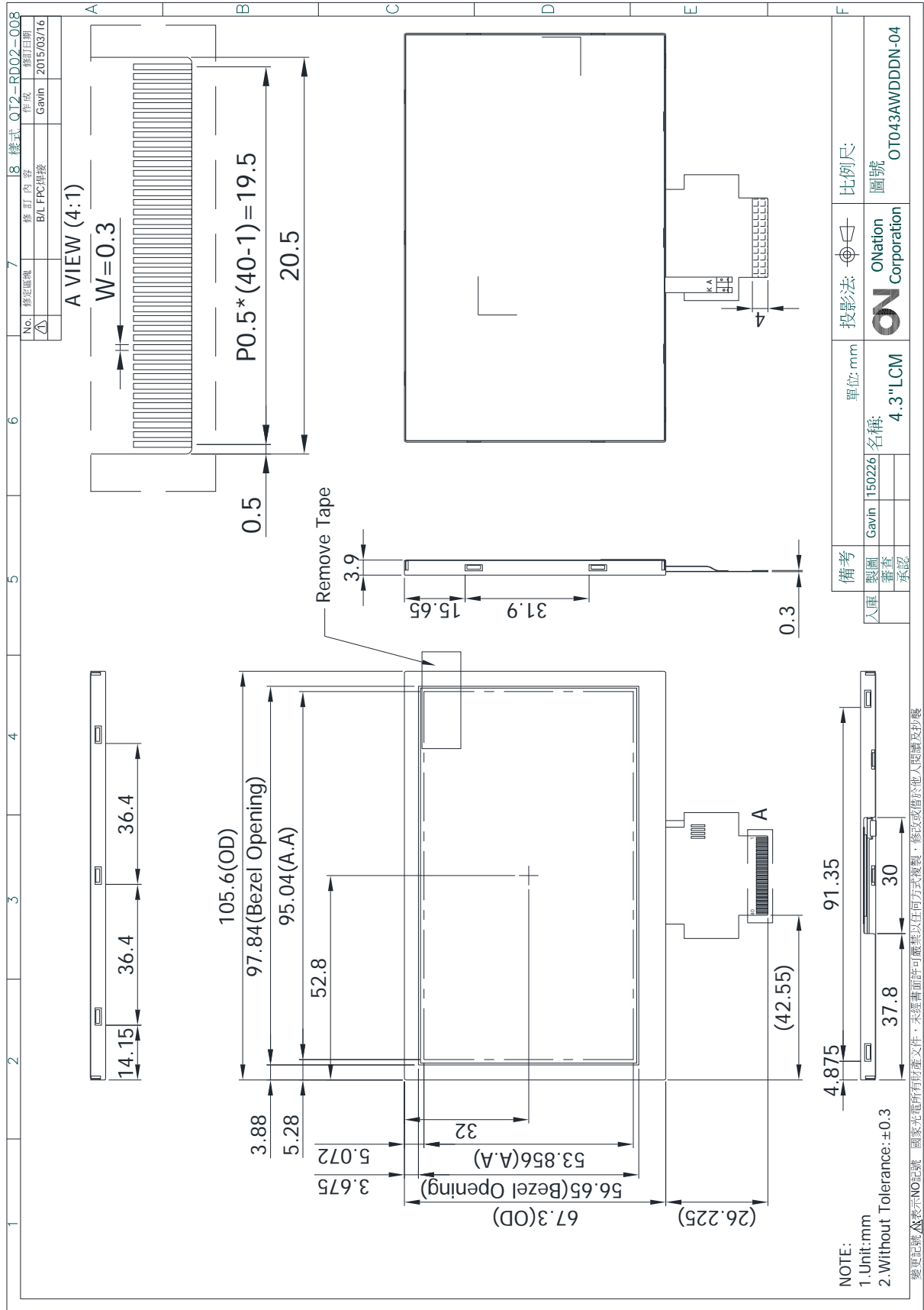
REV	DATE	PAGE	SUMMARY																																			
0.1	2015.03.02	ALL	Preliminary specification was first issued.																																			
0.2	2015.03.17	2	Change: 3. OUTLINE DIMENSIONS																																			
		17	Change: 11.MODEL NUMBER SYSTEM																																			
0.3	2015.12.18	1	ADD LED Type : Nichia NSSW206CT																																			
0.4	2016.06.21	15	ADD 10 RELIABILITY TEST																																			
			<table border="1"> <thead> <tr> <th>NO.</th> <th>ITEM.</th> <th>CONDITIONS.</th> <th>TIME PERIOD.</th> <th>REMARK.</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>High Temperature Storage.</td> <td>TBD.</td> <td>TBD.</td> <td>..</td> </tr> <tr> <td>2.</td> <td>Low Temperature Storage.</td> <td>TBD.</td> <td>TBD.</td> <td>..</td> </tr> <tr> <td>3.</td> <td>High Temperature Operation.</td> <td>TBD.</td> <td>TBD.</td> <td>..</td> </tr> <tr> <td>4.</td> <td>Low Temperature Operation.</td> <td>TBD.</td> <td>TBD.</td> <td>..</td> </tr> <tr> <td>5.</td> <td>Temperature Cycle.</td> <td>TBD.</td> <td>TBD.</td> <td>..</td> </tr> <tr> <td>6.</td> <td>High Temperature Humidity Storage.</td> <td>TBD.</td> <td>TBD.</td> <td>..</td> </tr> </tbody> </table>	NO.	ITEM.	CONDITIONS.	TIME PERIOD.	REMARK.	1.	High Temperature Storage.	TBD.	TBD.	..	2.	Low Temperature Storage.	TBD.	TBD.	..	3.	High Temperature Operation.	TBD.	TBD.	..	4.	Low Temperature Operation.	TBD.	TBD.	..	5.	Temperature Cycle.	TBD.	TBD.	..	6.	High Temperature Humidity Storage.	TBD.	TBD.	..
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0.5	2016.09.06	1	Modify: (8)Viewing Direction: 12 O'clock→6 O'clock																																			
			Delete: Gray Scale Inversion Direction																																			

2.MECHANICAL SPECIFICATIONS

(1)	Number Of Dots (Dots)	480(R.G.B) X 272
(2)	Module Size(mm)	105.6(H) X 67.3(V) X3.9(D) (**)
(3)	Active Area(mm)	95.04(H) X 53.856(V)
(4)	Pixel Pitch(mm)	0.198 (H) X 0.198(V)
(5)	LCD / Polarizer Model	TFT , Transmissive, Normally/White
(6)	Backlight Color	White, LED
(7)	LED Type	Nichia NSSW206CT
(8)	Viewing Direction	6 O'clock Horizontal : Right side 65°(typ.), Left side 65°(typ.) Vertical : Up side 50°(typ.), Down side 60°(typ.)
(9)	Electrical Interface	TTL Interface
(10)	Color Configuration	R.G.B Stripe
(11)	Module Weight(g)	TBD

(**)Module include FPC and component.

3. OUTLINE DIMENSIONS



4. INTERFACE PIN CONNECTION

4.1 LCM PANEL DRIVING SECTION

FPC PITCH=0.5mm,40PIN

PIN NO.	SIGNAL	FUNCTION	REMARK
1	NC	No connection	
2	NC	No connection	
3	NC	No connection	
4	NC	No connection	
5	NC	No connection	
6	LEDK	Backlight Unit(-)	
7	LEDA	Backlight Unit(+)	
8	GND	Ground	
9	VDD	Power Supply	
10	NC	No connection	
11	VSYNC	Vertical Sync Signal; Negative Polarity	
12	HSYNC	Horizontal Sync Signal; Negative Polarity	
13	DCLK	Clock Signal	
14	DE	Data Input Enable	
15	DISP	Display Control	Note1
16	R7	Red Data Signal	
17	R6	Red Data Signal	
18	R5	Red Data Signal	
19	R4	Red Data Signal	
20	R3	Red Data Signal	
21	R2	Red Data Signal	
22	R1	Red Data Signal	
23	R0	Red Data Signal	
24	G7	Green Data Signal	
25	G6	Green Data Signal	
26	G5	Green Data Signal	
27	G4	Green Data Signal	
28	G3	Green Data Signal	
29	G2	Green Data Signal	
30	G1	Green Data Signal	
31	G0	Green Data Signal	
32	B7	Blue Data Signal	
33	B6	Blue Data Signal	
34	B5	Blue Data Signal	
35	B4	Blue Data Signal	
36	B3	Blue Data Signal	

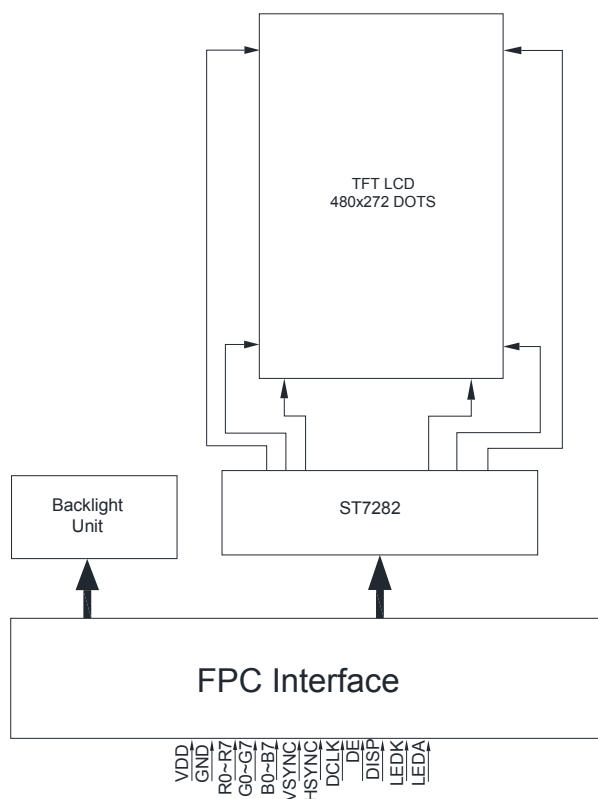
37	B2	Blue Data Signal	
38	B1	Blue Data Signal	
39	B0	Blue Data Signal	
40	GND	Ground	

Note1:

DISP="Low", Standby.

DISP="High", Normal display.

5. BLOCK DIAGRAM



6. ABSOLUTE MAXIMUM RATINGS

6.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Supply Voltage	VDD	-0.3	+4.6	V	
	VLED	-	20	V	

Note: The absolute maximum rating values of this product not allowed to be exceeded at any times. Should be module be used with any of absolute maximum ratings exceeded. The characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature(°C)	-20	70	-30	80	Note 1,2
Humidity(% RH)	10 ~ 90		10 ~90		Note 3

Note 1 : The response time will become lower when operated at low temperature.

Note 2 : Background color changes slightly depending on ambient temperature.

Note 3 : Storage Ta=60°C & RH=90% ≤240 Hrs.

7. ELECTRICAL CHARACTERISTICS

7.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25°C

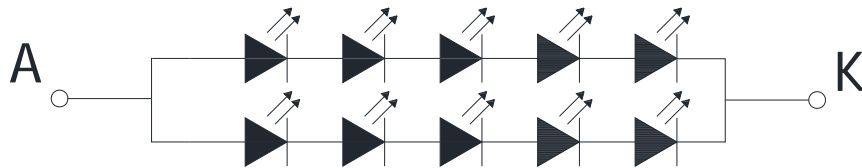
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power Voltage For LCD	VDD	3.0	3.3	3.6	V	
	IDD	-	20	40	mA	Note 1
High Level Input Voltage	VIH	0.7VDD	-	VDD	V	VDD=3.3V
Low Level Input Voltage	VIL	GND	-	0.3VDD	V	VDD=3.3V

Note 1 : Test condition : VDD =3.3V ; Test Pattern : Black.

7.2 BACKLIGHT UNITS

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
LED Driving Voltage	VLED	-	16	18	V	
	ILED	-	40	-	mA	VLED=16V



8. OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK
Contrast Ratio	CR	Viewing Normal Angle $\Theta_x = \Theta_y = 0^\circ$	250	350	-	-	Note 1
Response Time	TR+TF		-	30	45	ms	Note 2
Chromaticity	White	Wx	(0.252)	(0.302)	(0.352)	-	Note 4
		Wy	(0.288)	(0.338)	(0.388)	-	
Viewing Angle	Hor.	θ_{x+}	55	65	-	Deg.	Note 3
		θ_{x-}	55	65	-		
	Ver.	θ_{y+}	40	50	-		
		θ_{y-}	50	60	-		
Luminance	L	ILED=40mA	450	500	-	cd/m2	
Luminance Uniformity	YU		70	-	-	%	Note 5

Note 1 : Definition of Contrast Ratio (CR) :

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63}/L_0$$

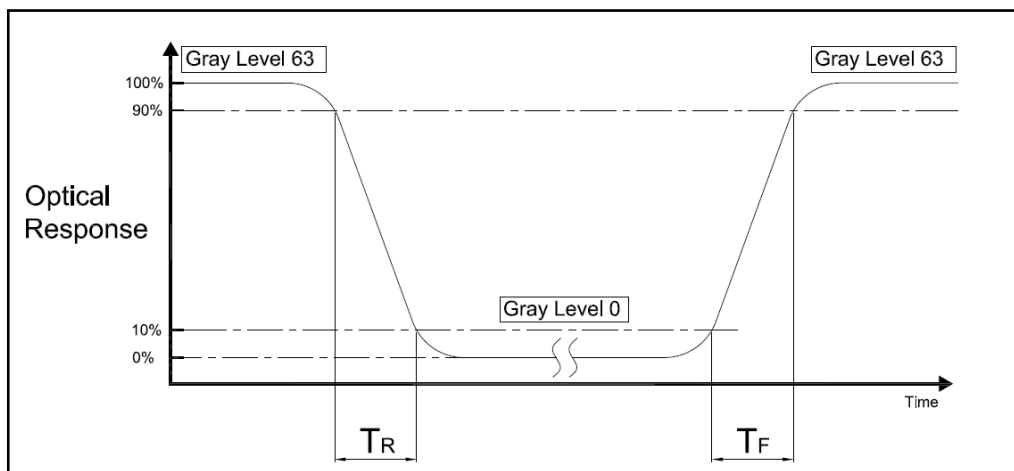
L63 : Luminance of gray level 63

L0 : Luminance of gray level 0

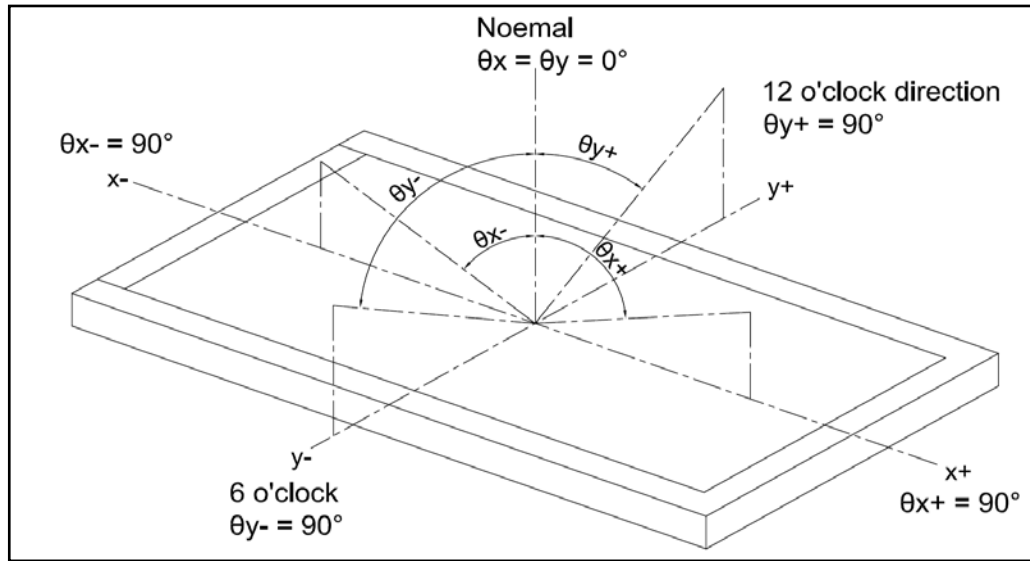
$$CR = CR(5)$$

CR(X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5

Note 2 : Definition of Response Time (TR.TF)

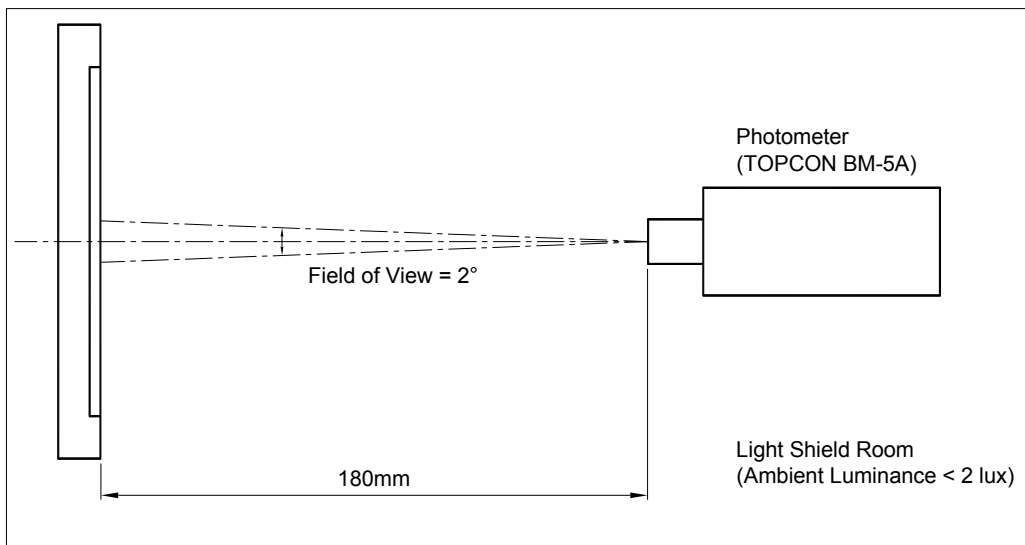


Note 3 : Definition of Viewing Angle

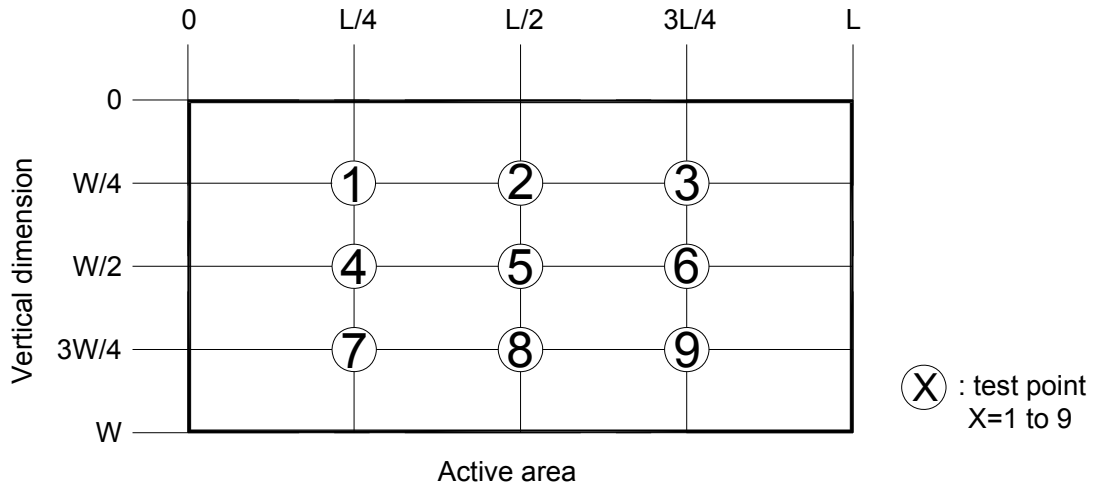


Note 4 : Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



Note 5 :



$$\left(1 - \frac{\text{MAX Luminance} - \text{Average Luminance}}{\text{Average Luminance}} \right) \times 100\% \geq 70\%$$

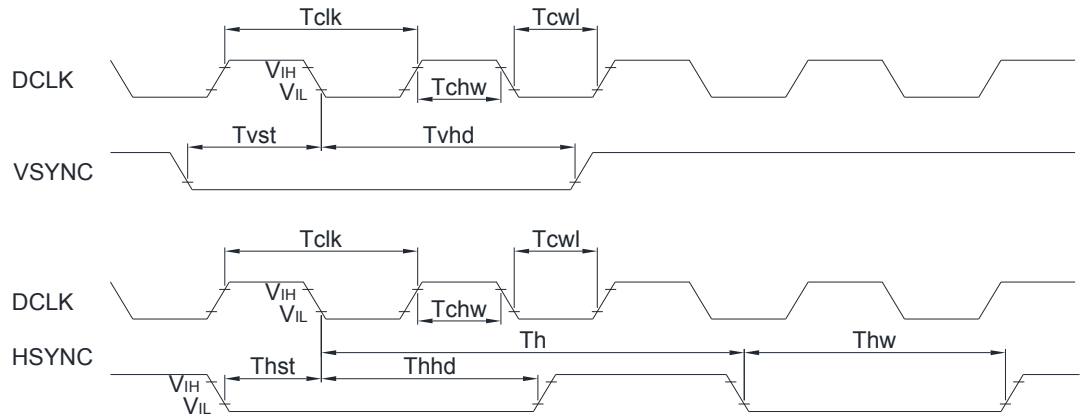
9. TIMING SPECIFICATIONS

9.1 AC CHARACTERISTICS

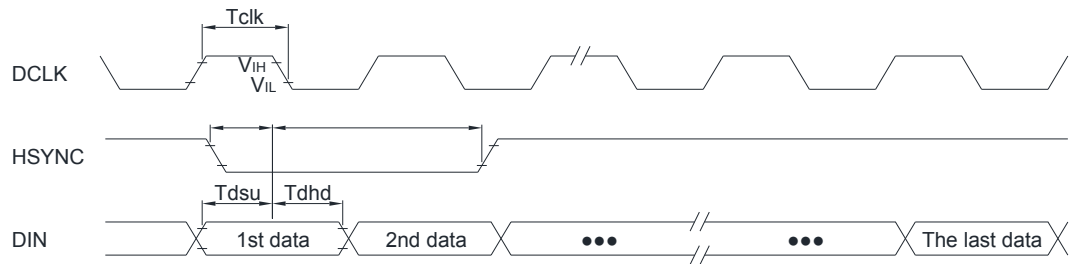
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
System operation timing						
VDD power source slew time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
Input/Output timing						
CLK pulse duty	Tcw	40	50	60	%	
Hsync width	Thw	1	-	-	ns	
Hsync period	Th	55	60	65	us	
Vsync setup time	Tvst	12	-	-	ns	
Vsync hold time	Tvhd	12	-	-	ns	
Hsync setup time	Thst	12	-	-	ns	
Hsync hold time	Thhd	12	-	-	ns	
Data setup time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	
SD output stable time	Tst	-	-	12	us	Output settled within +20mV Loading=6.8k+28.2pF
GD output rise and fall time	Tgst	-	-	6	us	Output settled (5%~95%), Loading=4.7k+29.8pF
3-wire serial communication						
Delay between CSB and Vsync	Tcv	1	-	-	us	
CS input setup time	Ts0	50	-	-	ns	
Serial data input setup time	Ts1	50	-	-	ns	
CS input hold time	Th0	50	-	-	ns	
Serial data input hold time	Th1	50	-	-	ns	
SCL pulse high width	Twh1	50	-	-	ns	
SCL pulse low width	Twl1	50	-	-	ns	
CS pulse high width	Tw2	400	-	-	ns	

9.2 AC TIMING DIAGRAM

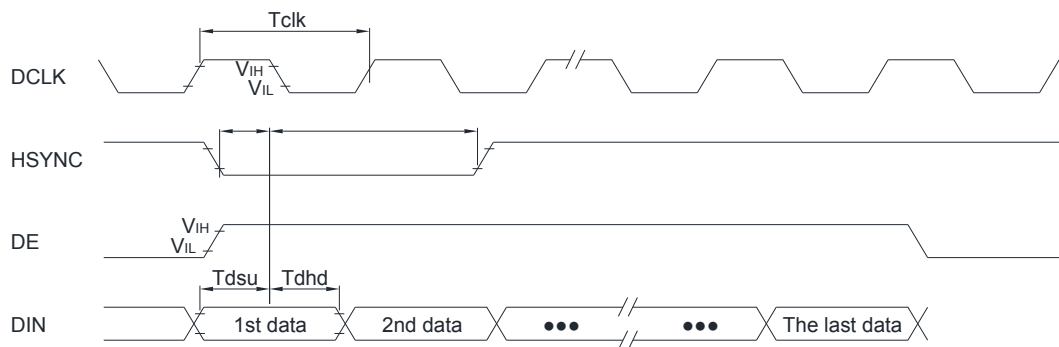
9.2.1 CLOCK AND DATA INPUT TIMING DIAGRAM



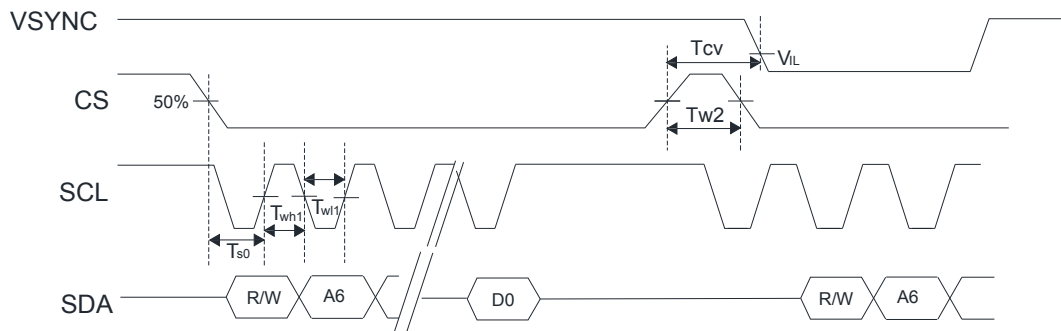
9.2.2 SYNC MODE



9.2.3 SYNC-DE MODE



9.2.4 3-WIRE COMMUNICATION TIMING DIAGRAM



9.3 RGB INPUT TIMING TABLE

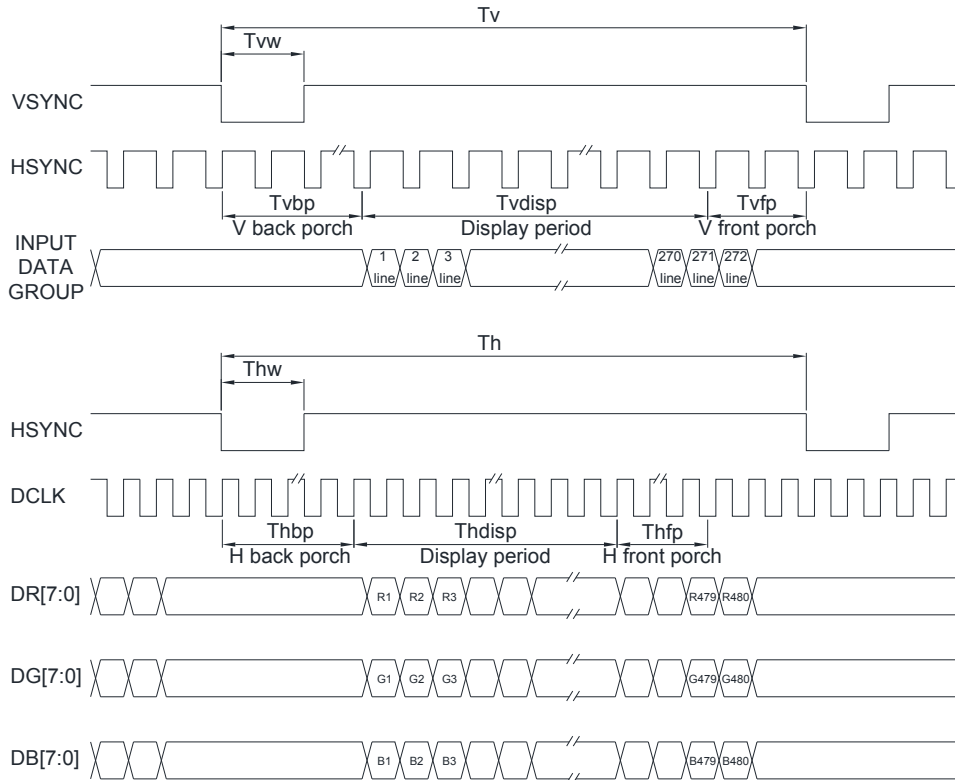
9.3.1 PARALLEL 24-BIT RGB TIMING TABLE

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
DCLK frequency		Fclk	9	12	15	MHz	
DCLK period		Tclk	67	83	111	ns	
HSYNC	Period Timing	Th	486	526	533	DCLK	
	Display period	Thdisp	-	480	-	DCLK	
	Back porch	Thbp	3	43	50	DCLK	By H_Blanking setting
	Front porch	Thfp	2	2	2	DCLK	
	Pulse width	Thw	1	1	1	DCLK	
VSYNC	Period time	Tv	276	286	303	H	
	Display period	Tvdisp	-	272	-	H	
	Back porch	Tvbp	2	12	30	H	By V_Blanking setting
	Front porch	Tvfp	1	1	1	H	
	Pulse width	Tvw	1	1	1	H	

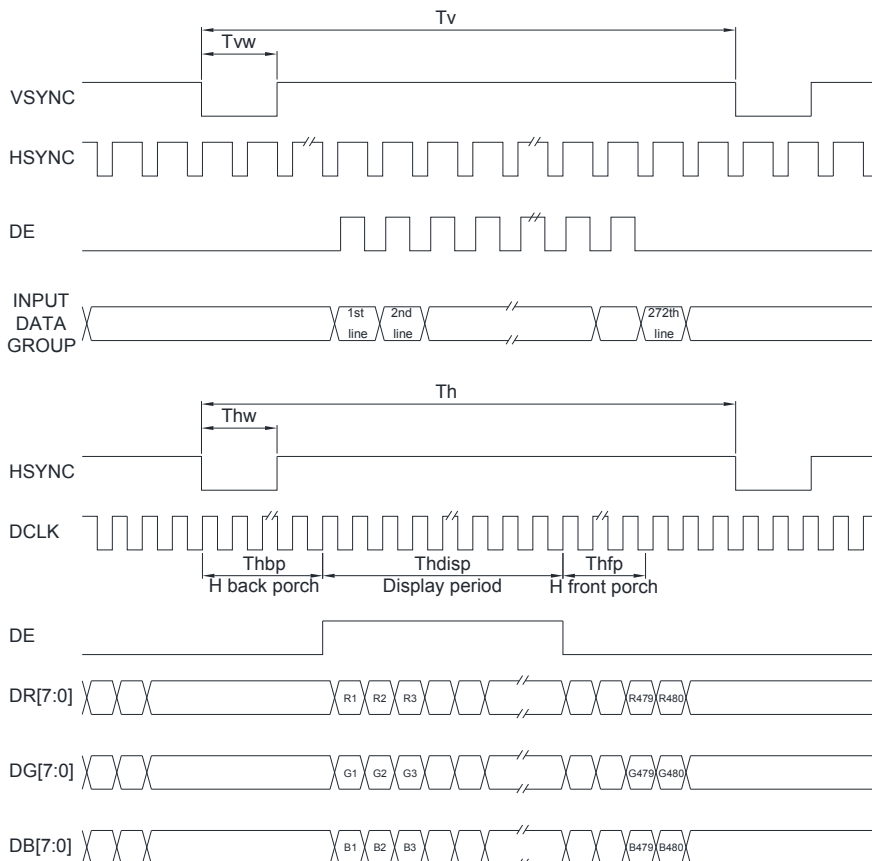
9.3.2 SERIES 8-BIT RGB TIMING TABLE

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
DCLK frequency		Fclk	24	27	30	MHz	
DCLK period		Tclk	33	37	42	ns	
HSYNC	Period Timing	Th	1560	1716	1900	DCLK	
	Display period	Thdisp	-	1440	-	DCLK	
	Back porch	Thbp	108	129	255	DCLK	By H_Blanking setting
	Front porch	Thfp	12	147	205	DCLK	
	Pulse width	Thw	1	1	50	DCLK	
VSYNC	Period time	Tv	274	288	335	H	
	Display period	Tvdisp	-	272	-	H	
	Back porch	Tvbp	1	12	32	H	By V_Blanking setting
	Front porch	Tvfp	1	4	31	H	
	Pulse width	Tvw	1	10	30	H	

9.4 SYNC MODE TIMING DIAGRAM

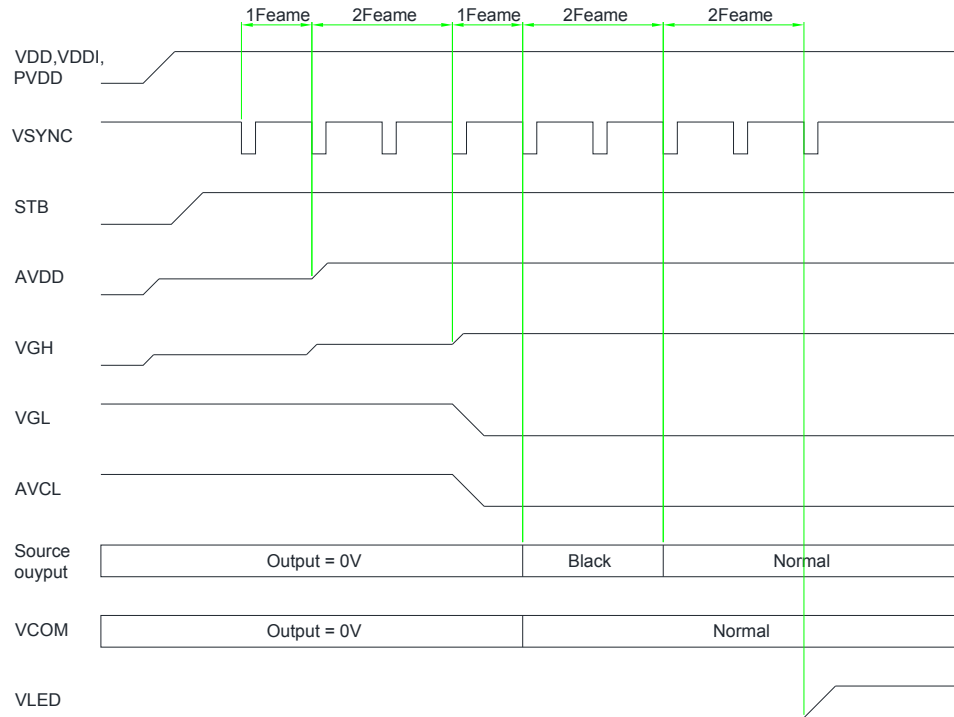


9.5 SYNC-DE MODE TIMING DIAGRAM

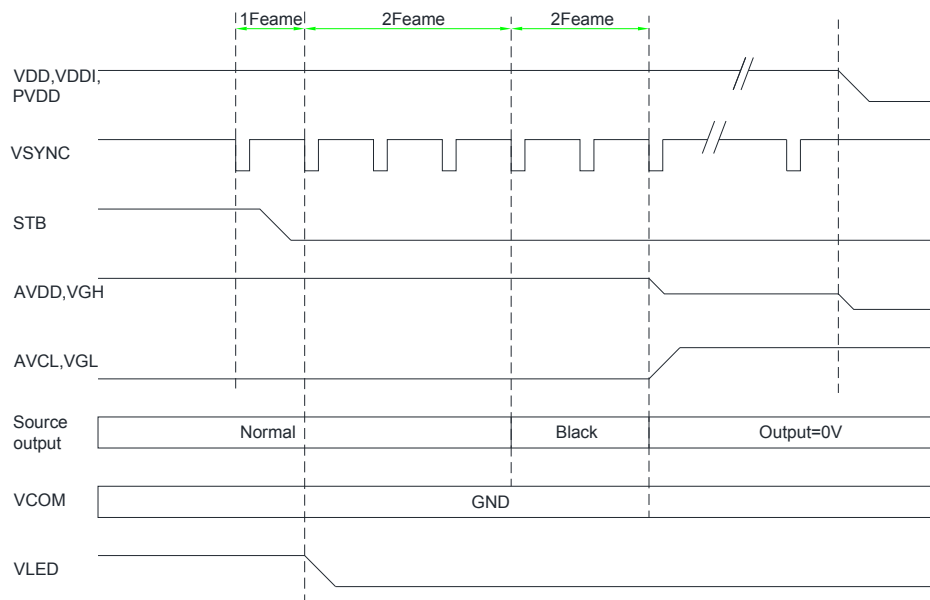


9.6 POWER ON/OFF SEQUENCE

9.6.1 POWER ON SEQUENCE



9.6.2 POWER OFF SEQUENCE



Note: Please refer to ST7789V data sheet for more details.

10. RELIABILITY TEST

ENVIRONMENTAL TEST				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	(80°C)	240HRS	
2	Low Temperature Storage	(-30°C)	240HRS	
3	High Temperature Operation	(70°C)	240HRS	
4	Low Temperature Operation	(-20°C)	240HRS	
5	Temperature Cycle	(-30°C) ~ (80°C) (15min) (15min)	10CYCLE	
6	High Temperature Humidity Storage	(60°C) (60%90RH)	240HRS	

Note 1: a. The module should work properly.

b. Before and after function test, The difference of consumptive current. Should be within 10%

Note 2: a. The module should work properly.

b. The module won't be deformative, Color changeable or broken.

c. The modules can't be apart.

Note 3: a. Before cosmetic and function test, The product must have enough recovery time, At least 2 hours at room temperature.

10.1 VIBRATION TEST :

10.1.1 STATE LABORATORY ENVIRONMENT :

Room temperature : $25\pm 3^{\circ}\text{C}$
Relative humidity : $55\pm 20\% \text{RH}$

10.1.2 TEST METHOD / SPECIFICATION :

Sample Status : Non-packaged single state
Waveform : Sine
Frequency : 10~55~10Hz
Full amplitude : 1.5mm
Vibration direction : X,Y,Z Axis (3 Axial)
Test time : Each 2Hour / X,Y,Z Axis , Altogether 6 Hour

10.2 MECHANICAL SHOCK TEST :

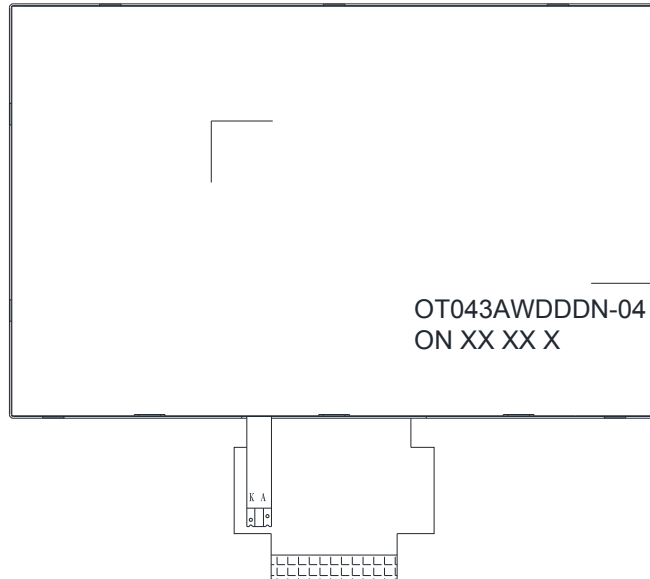
10.2.1 STATE LABORATORY ENVIRONMENT :

Room temperature : $25\pm 3^{\circ}\text{C}$
Relative humidity : $55\pm 20\% \text{RH}$

10.2.2 TEST METHOD / SPECIFICATION :

Sample Status : Non-packaged single state
Waveform : Half-sine
Acceleration : 1G
Shock Time : 6ms
Impact direction : 6 Directions ($\pm X$, $\pm Y$, $\pm Z$ axes)
Number of shocks : Each direction 3 Secondary , Altogether 18 Secondary

11.MODEL NUMBER SYSTEM



(a) MODEL NAME : OT043AWDDDN-04

(b) LOT NO : XX XX X

CODE	MEANING	DESCRIPTION
<u>XX</u>	Year	2013=13, 2014=14, 2015=15,
<u>XX</u>	Month	01,02,03,04,05,06,07,08,09,10,11,12
<u>X</u>	Week	1,2,3,4,5,6

12. LCM INSPECTION STANDARD

Inspection specifications refer ONation Corporation LCM INSPECTION STANDARD Document.
Document Number : QT3-QC-A-I001

13. PACKAGE INFORMATION

LCM MODEL	LCM QTY. IN THE BOX	INNER BOX SIZE(mm)	WEIGHT	REMARK
OT043AWDDDN-04	TBD	TBD	TBD	

14.PRECAUTIONS FOR USE

14.1 SAFETY

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

14.2 STORAGE CONDITIONS

- (1) Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $50\pm 20\%\text{RH}$.
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.

14.3 HANDLING PRECAUTIONS

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
- (6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
- (10) Wipe off water droplets or oil immediately . If you leave the droplets for a long time, staining and discoloration may occur.
- (11) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

14.4 WARRANTY

- (1) Acceptance inspection period
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- (2) Applicable warrant period
The period is within 12 months since the date of shipping out under normal using and storage conditions.